

Fish Biology and Biodiversity Conservation Sub-component

**The Regional GIS Biodiversity Meeting, Colline Hotel, Mukono
Uganda
13th – 15th January 2005**

**Fisheries Resources Research Institute (FIRRI), Jinja Uganda
Tanzania Fisheries Research Institute (TAFIRI), Mwanza Tanzania
Kenya Marine and Fisheries Research Institute (KMFRI), Kisumu Kenya**

January 2005

Acc no 6183

List of acronyms:

DWD	Department of Water Development
EAC	East African Community
EU-LVFRP	European Union - Lake Victoria Fisheries Research Project
FIRRI	Fisheries Resources Research Institute
FL	Forkal length
GIS	Geographical Information System
GPS	Geographical Positioning System
ID	Identity
KMFRI	Kenya Marine and Fisheries Research Institute
LVFO	Lake Victoria Fisheries Organisation
LVEMP	Lake Victoria Environment Management Project
MUIENR	Makerere University Institute of Environment and Natural Resources
NEMA	National Environment Management Authority
NES	National Executive Secretary
NWG	National Working Group
PCC	Project Component Coordinator
pH	Hydrogen ion concentration
TAFIRI	Tanzania Fisheries Research Institute
TL	Total length
TOR	Terms of Reference
TN	Total nitrate
TP	Total phosphorus

Agenda 1: Opening of the workshop

Welcoming remarks by the PCC, Uganda

Dr. Lucas Ndwula on behalf of the PCC-Uganda, Dr. F Wanda reminded the participants that the Fish Biology and Biodiversity Conservation sub-component had a duty to produce two major outputs: Two Books; one on the fishes and the other on the biodiversity of Lake Victoria Basin and an Atlas of Aquatic Biodiversity of the Lake Victoria Basin to complement the books.

He reiterated that the workshop meeting was endorsed by World Bank mission and therefore was necessary to convene it to draw a roadmap to the production Aquatic Biodiversity Atlas. He noted that the production of the biodiversity atlas was behind schedule and thus as a regional sub-component, we have to work around the clock to beat the deadline of March 2005.

Welcoming remarks by the PCC, Kenya

Dr. E. Wakwabi reported that the two books on the fishes and biodiversity of Lake Victoria basin had been submitted to the regional secretariat accompanied with proposals for final production. He acknowledged the component's collaborative advantage in research on the lake, which goes beyond the LVEMP, but also in the EU-LVFRP project. He urged the participants to take due advantage of this and do better as a component. He further commended the formation of LVFO under EAC as a product of the collaboration between the fisheries components on matters concerning Lake Victoria. He urged the participants to feel free to ascend to those positions arising in the two institutions.

The PCC underscored the importance of the meeting in brainstorming on how to generate information to produce the Biodiversity maps, which will go along way in helping communities and other stakeholders to realise what is happening on the lake. He acknowledged the capacity within the region to produce the maps from individual and institutional perspectives. He therefore did not see the need to hire a consultant to do the work. However, if need arises the consultant should work with us hence empowering the technical capacity in the institutions. He also reminded members of the Fisheries Conference due to take place at Entebbe in February 2005 at which we would deliberate further on this very output.

He concluded by saying that the deliberations of this meeting should give us a clear road map on how to generate the Biodiversity Atlas since it had been specified to the World Bank that it would be a major output of the Project.

Welcoming remarks by the PCC, Tanzania

Mr. Mahongo echoed the sentiments of the previous PCCs that the books and the atlas would be the most important indicator- outputs for the project. He informed the workshop that in their deliberations, they should take into consideration that LVEMP

-Tanzania ends its project activities by June 2005, hence the need to expedite the process so as to complete the production of the atlas within the remaining timeframe.

Opening remarks by the NES, Uganda

Dr. John Baliwa on behalf of the NES Uganda Dr. Orach-Meza welcomed the participants to Mukono in particular and to Uganda in general. He underscored the need for proper communication mechanisms in light of the changing face of science in which things being done and how they are produced address millennium development goals. He echoed what the PCCs mentioned and further noted that without a biodiversity inventory and biodiversity atlas, our communication means would be regarded as weak, hence the necessity to produce an atlas. He stressed the atlas should give a clear (inventory) of Lake Victoria biodiversity so as to enable creating interventions on habitat, especially those in satellite lakes etc.

He emphasised the importance of the biodiversity output as a source of interventions by fishers, managers and communities and reiterated the need to take the exercise seriously in the time frame available so that we enter LVEMP-II on the strength of what has been done in LVEMP-I, and that the secretariat expects the output of this meeting to show the value for money.

He concluded his remarks on the note that aquatic biodiversity information must be interactive in order to be of value and that the atlas would provide an input for the regional synthesis report.

With these remarks he declared the workshop open at 1:05 pm.

Agenda 2: Presentation and adoption of the agenda items and meeting programme

The agenda and the workshop programme were considered, discussed and adopted as appended in annexes I & II. Mr D. Masai proposed the agenda items and were seconded by Mr. S. Wandera while Mr D.Mbabazi proposed the programme and was seconded by Dr. L. Ndawula.

Agenda 3: Evaluation of existing biodiversity resource base, manpower, equipment, software, consultancies, TORs and Base maps.

Each country presented their existing capacity to undertake the production of GIS generated atlas as follows:

Uganda:

Datasets: Geo-referenced data on abundance, distribution and species composition of fish, algae, aquatic invertebrates, small mammals, reptiles, macrophytes, amphibians and birds; environmental (water quality) variables.

GIS capacity: Arc GIS 3.2 software,

- Lack computers for GIS at present.

- Human Resource Capacity available, especially through collaborations

Collaboration: National Environmental Management Authority (NEMA), Makerere University

University Institute of Environment and Natural Resources (MUIENR) and Directorate of Water Development (DWD)-Water quality and ecosystem component of LVEMP.

Tanzania:

Datasets: Geo-referenced data on fisheries, catch rates, species composition, invertebrates, macrophytes, birds, mammals and environmental data.

GIS capacity: Lack Arc GIS software

Lack computers for GIS

Human resource capacity only with collaborators

Base maps and related GIS capacity can be accessed through collaboration with Water quality and ecosystem component of LVEMP.

Collaborators: University of Dar-es-salaam; Institute of Resource Assessment and institute of Marine Science- Zanzibar.

Kenya:

Datasets: Geo-referenced data on species composition, abundance and distribution of fish, phytoplankton, macrophytes, birds, micro and macro- invertebrates and other vertebrates; catch rates and environmental parameters.

GIS Capacity: Arc GIS 8.1, Arc View 3.3 and Spatial Analyst 3.3

4 computers, digitising table and plotter available.

Human resource capacity available

Geo referenced base maps available, though of low resolution

Collaborators: Wetlands Component, Regional Centre for Mapping and Remote Sensing, Nairobi

It was resolved that there is capacity in the region to produce the Biodiversity Atlas. It was therefore recommended to collaborate across the region in the production of the atlas.

Agenda 4: Harmonization of biodiversity datasets, data formats and products

Core datasets that are available and need to be harmonised were outlined.

These data on fish include:

Date of sampling, location as identified by name of station or station ID and GPS position, species composition (weights and numbers) and gears used; individual fish- Sex, lengths, weight, maturity and food; description of habitat type, Total depth and sampling depth where applicable.

Data on environment include:

Temperature ($^{\circ}\text{C}$), Dissolved oxygen (mg/l), pH, Secchi. disc (m), Conductivity ($\mu\text{s/cm}$), Total phosphorus, Total nitrogen, Soluble Reactive Phosphorus (SRP).

Silicates, Nitrates, Nitrites, Chlorophyll-a, Sulphates, Primary productivity estimates, Turbidity, Zn, Cu and Hg levels, Pesticides. These data too have respective locality identity and dates.

Data on phytoplankton and micro and macro-invertebrates include: species composition, abundance ($\text{nm}^{-2}/\text{nl}^{-1}$ for zooplankton, nm^{-2} for benthos and nl^{-1} for phytoplankton); the gear used i.e. plankton net for zooplankton and algae, Van Dorn for vertical depth sampling, Ekman grab or Ponar grab for benthos.

The workshop went into 2 working groups, one on fish and the other on environment and other biota to discuss how to harmonise the data sets and design suitable formats for a unified GIS-based database. The groups reconstituted for plenary presentation and presented as follows:

GROUP I:

Group I discussed the fisheries data and agreed that coding of the fish species (ID) i.e. to include the first letter of the generic name and the first three letters of the specific name. e.g. *Lates niloticus* (Lnif), *Oreochromis niloticus* (Onif), *Synodontis victoriae* (Svic) etc. All haplochromines will be abbreviated as 'Haps' and *Barbus* species as 'Barb' except *Barbus altianalis*, which is very distinctive.

Recommended adoption of distribution data on *Rastrineabola argentea* collected during the hydroacoustic surveys under LVFRP II in the GIS database. Total length was recommended for all fishes and should be coded as TL and Fork length as FL for forked-tailed fishes.

It was agreed to consider haplochromines as a group but append specific information like 'rocky environment' that could help to characterise taxonomical distinction among the group.

It was resolved to drop the terms "inshore" and "offshore" to avoid ambiguity associated with them in describing location and recommended to stick on GPS recordings as those are definite.

Group II

Formats for inputting data in attributes tables of GIS database on abundance (n/m^2) of the following taxa groups: phytoplankton, zooplankton, benthic macro-invertebrates, macrophytes, reptiles, amphibians, mammals, birds as well as environmental parameters were discussed

The following fields of control variables for environmental data and abundance data of each of above-mentioned taxa were proposed:

- Water body
- Station ID
- Description
- Latitude
- Longitude

- Total depth
- Sampling depth
- Date

ii) Explorable variables e.g. abundance for the taxa considered would include fields:

- Species-1----- species -n for species composition
- Species richness
- Species diversity

Formats for environmental data will include explorable variables under fields of Temperature, pH, Dissolve Oxygen, Conductivity, TP, TN, NO₃, Silica, SRP, chlorophyll-a, and primary productivity (O₂ mg/l), Secchi depth, light attenuation.

It was recognised that data sets on macrophytes included just species composition and qualitative descriptors rather than quantitative ones. Therefore these data may just remain meta databases unless they are GPS position referred

For birds, reptiles, amphibians and mammals, it was observed that data on species composition and numbers was available.

The proposed data formats are as attached in Annex IV.

Agenda 5: National and regional coordination and review workshops

It was decided that scientists should start organizing data into the agreed formats of geo-referenced databases at national level. It was further advised that Project Component Coordinators constitute working groups and facilitate them functionally to accomplish the data reorganization and reorientation in the agreed formats by 8th February 2005. The groups should comprise the following thematic areas: Fish; Environment, micro and macro-invertebrates; and higher vertebrates and macrophytes.

Agenda 6: Definition of activities and allocation of responsibility leading to output production

- The core activities envisaged included; Data harmonization, Data formatting and integration.
- The PCCs to ensure that the national working groups are facilitated to develop the geo-referenced data sets as necessary on fish; environment, micro and macro-invertebrates; higher vertebrates and macrophytes. Then ensure that reformatted geo-referenced data attribute tables/databases are forwarded to the focal persons for processing into map outputs.
- Mr Obade from Kenya was identified as the regional focal person to be assisted by Mr. S.B.K. Sekiranda from Uganda, and Mr. R.J. Kayanda from Tanzania, as co-focal persons to work on the GIS- formatted data sets to produce prototype map outputs. The trio will convene in Kisumu, Kenya for a week or so to work on the map outputs.

- Kenya agreed to provide the high-resolution base maps of the Victoria and Kyoga basins and associated satellite lakes for the purpose of regional GIS analyses and map outputs.
- The PCC's to ensure the regional workshop takes place in good time to review the prototype map outputs.

Agenda 7: Time frame for production of Atlas

The meeting agreed on the following schedule of activities and time frame.

Activity	Time frame
Formation of National Working Group	21 st Jan. 2005
Acquisition of base maps	21 st Jan. 2005
Formation and integration of data by NWG	30 th Jan. 2005
Submission of integrated/ formatted data to the focal persons	8 th Feb. 2005
Developing prototypes of data outputs in Kisumu	9 th -13 th Feb. 2005
National review of the prototypes Atlas (gathering all suggestions to improve on prototypes)	14 th -27 th Feb. 2005
Regional workshop to review the developed prototypes	13-19 th Mar. 2005
Submission of final product	25 th Mar. 2005

Agenda 8: Budgets

The regional review workshop will be held for 5 working days. The three countries confirmed that they were in a position to facilitate participants to the regional workshops. It was also agreed that Uganda and Tanzania could facilitate a minimum of 5 participants each to the regional workshop.

The issue regarding financing of collaborators was deferred for later discussion under A.O.B.

Kenya was requested and agreed to acquire the necessary base maps for the component.

Ground-truthing was proposed on some GPS positions that would be found missing or improperly recorded.

Agenda 9: Authorship

It was agreed that all sources of data be acknowledged accordingly and that the participating institutions be acknowledged in the executive summary.

The meeting proposed that the atlas be a LVEMP publication, compiled and edited by the 3 focal persons (Mr P.T.Obade, Mr. S.B.K. Sekiranda, and Mr. R.J. Kayanda) and that other members of the Regional Working Group be listed as contributors.

The members agreed that the title of the Atlas shall be "Atlas of Aquatic Biodiversity of Lake Victoria Basin". Each page of the atlas shall have a title and the names of contributors.

Agenda 10: Progress on the books

Dr Wakwabi presented the status of the books on Fisheries and Biodiversity. He stated that the time frame set for submission of the corrected versions of the books to the NESs and final drafts to the RES was not followed. The de-linked book covers and spine were also received late and submitted separately. The final drafts have already been submitted to the RES.

He reminded the meeting that TORs for reviewers were apparently not developed together with the TORs for editors during the Eldoret workshop. Therefore the Regional Coordinator in consultation with Mr. Mahongo (PCC Tanzania) prepared and submitted the TORs for reviewers to RES.

Mr. Mahongo agreed to follow up the progress of the books and any new developments will be communicated to the Regional Coordinator immediately.

Agenda 11: A.O.B

1. LVEMP Synthesis reports

The chairman requested for comments on the synthesis report, as agreed after the Jinja meeting. Mr. Mahongo reminded the meeting that the synthesis reports were initially to be prepared by consultants but the NES's decided that scientists do the work locally. Contents of the reports were to be extracted from the three Countries' State Of Environment (SOE) reports, which are already under preparation.

2. The participants emphasized the need for the cooperation and inclusion of other related components under LVEMP as a means of adding data and value to the Biodiversity Atlas. Identified components included: Fisheries Management; Wetlands; Water hyacinth and Water quality Management.

The participants requested the NESs in the three countries to provide full support to these components so that they can contribute to the timely production of the Biodiversity Atlas.

3. GIS capacity at the Focal point- KMFRI, Kisumu was assessed and accepted for the activity.

4. EAC- LVFO Fisheries Conference Entebbe, Uganda.

Dr. Wakwabi briefed participants that the conference organized by the EAC-LVFO will be held in Entebbe, Uganda from 24th – 26th February 2005 with a strong focus on the stakeholders, so that the regional MPs can clearly capture issues and existing information and data on Lake Victoria basin resources. Information to be presented has been identified within major thematic areas, and will not necessarily be of scientific format per se, but explore all relevant areas covering the interests of all stakeholders (e.g. Omena and Mputa fisheries; fishing grounds and breeding areas; law and piracy issues; Trade; etc). This will aid in management and sustainable

utilization of Lake Victoria resources, and also curb unnecessary conflicts across borders of riparian countries.

Agenda 12: Way forward

The workshop agreed to adopt the activity and time frame as listed in Agenda 7 to constitute the way forward.

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Mr. Mahongo assured the meeting that he will be following the progress of the books and any new developments will be communicated to the Regional Coordinator immediately.

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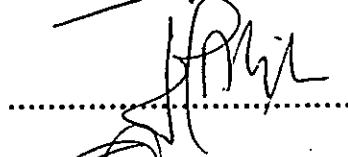
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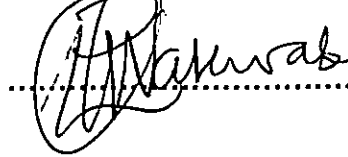
 Ndawula Lucas
(PCC, Uganda)

Mahongo Shigalla
(PCC, Tanzania)

Wakwabi Enock
(PCC, Kenya)







Date: 15 January 2005

Date: 15th Jan. 2005

Date: 18/1/05

Annex I: Agenda

1. Opening of the workshop
2. Adoption of Agenda and program of the workshop
3. Evaluation of the existing resource base, manpower, equipment, software, consultancies, TOR and base maps
4. Harmonization of biodiversity databases, data formats and products.
5. National and regional coordination and review workshops
6. Responsibility allocation and definition of activities leading to output production.
7. Time frame for production of Atlas
8. Budgets.
9. Authorship.
10. Progress on the Books.
11. AOB
12. Way Forward
13. Closing session.

Annex II: Workshop Programme

Day	Time	Activity	Responsible person - Rapporteur/s
		DAY ONE	
13 January 2005	8:30	Registration of participants	
	9:00	Opening Session	Project Component coordinator, Uganda
		Welcome Remarks	Project Component Coordinators, Tanzania and Kenya
		Comments	
		Official opening remarks	NES-UGANDA
	11:00	Tea break	
	11:00 – 13:30	Presentation and adoption of the Agenda item and meeting Programme	All participants
	13.30 – 14.30	Lunch break	
	14:30 – 16:00	Evaluation of the existing resource base, manpower, equipment, software, consultancies, TOR and base maps	All Rapporteur-Uganda – T/Leader
	16:00 - 16.15	Tea Break	
TWO 14 January 2005	16:15- 17:00	Continuation - Evaluation of the existing resource base, manpower, equipment, software, consultancies, TOR and base maps	CHANDE Rapporteur -Uganda
	17:00	Summary of the day one activities	
		DAY TWO	
	09:00 – 10:30	Harmonization of biodiversity databases, data formats and products.	MASAI - Chair TZ- Rapporteur
	10:30 – 11:00	Tea Break	
	11:00 - 13:00	Continuation – Harmonization of biodiversity databases, data formats and products.	MASAI- Chair TZ- Rapporteur
	13:00 – 14:00	Lunch Break	

Day	Time	Activity	Responsible person - Rapporteur/s
	14:00 – 15:00	National and regional coordination and review workshops	Chairman Uganda-WANDERA-Rapporteur –TZ.
	15:00 - 16:30	Responsibility allocation and definition of activities leading to output production.	Chairperson-NAMULEMO Rapporteur –TZ
	16:30 – 17:00	Tea Break	
	17:00 – 18:30	Time frame for production of Atlas	Chairperson-NAMULEMO Rapporteur - Obade
		Summary of days activities	
		DAY THREE	
THREE 15 January 2005	08:30 – 10:30	Budgets.	Regional Coordinator ALL Task Leaders-Rapporteur
		Authorship	Regional Coordinator ALL Task Leaders-Rapporteur
	10:30 – 11:00	Tea break	
	11:00 – 11:40	Progress on the Books	Regional Coordinator
	11:40 – 12:00	AOB	
	12:00 – 13:00	Rappoteurs report	All Rapporteurs
	13:00 – 14:00	Lunch break	
	15:00 – 16:30	Adoption of the Workshop report	Rapporteur
		Way Forward	
		Closing session	Director -FIRRI

Annex III: List of Participants

Name	Designation	Country	Address
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Annex IV: See attached Excel file

LAKE VICTORIA BASIN_ZOOPLANKTON SPECIES COMPOSITION								
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[illegible]

[illegible]

LAKE VICTORIA BASIN_MAMMMALS SPECIES COMPOSITION

[illegible]

[illegible]

[illegible]

[illegible]

LAKE VICTORIA BASIN MACROPHYTE SPECIES COMPOSITION

[illegible]

[illegible]

Annex V: Closing Remarks

The Director, FIRRI, acknowledged the progress made towards preparation of the Biodiversity Atlas. He however noted that although the way forward has been determined, the biggest challenge ahead would be implementing the production of the final product.

He appreciated the importance of the GIS Maps/Atlas as a product of LVEMP I. He pointed out that the issues and the gaps raised in these, maps will justify funding for monitoring activities within the lake basin when LVEMP II comes into place. He appreciated that the production of the Atlas/Maps is possible locally within the research institutions.

On the progress towards the production of the maps, he noted that the regional coordinator would monitor closely the progress made by various national groups toward achieving this goal. He anticipated that come time for the regional workshop, the prototype maps would be ready for discussion.

He also noted that the Maps could be published in the LVEMP Website, which would be achieved faster than the publication of the two books.

With those few remarks, he declared the workshop officially closed.